

12007

Pigeonite Basalt

65.2 grams

DRAFT



Figure 1: Freshly-broken, hackly surface of 12007 showing elongate pyroxene crystal. NASA photo# S76-25877. Edge of cube at top is 1 cm.

Introduction

12007 is a coarse-grained pigeonite basalt (figure 1).

Petrography

Lunar basalt 12007 is a relatively coarse-grained pigeonite basalt ("microgabbro") with about 15 % zoned pyroxene phenocrysts set in ophitic to variolitic groundmass of plagioclase, pyroxene, ilmenite and cristobalite with minor ulvöspinel, troilite, metallic iron, fayalite, tranquillityite, apatite and two immiscible glasses (Baldridge et al. 1979). The groundmass is relatively coarse-grained (~1 mm) in this rock (figure 2). Pyroxene phenocrysts range up to 3.2 mm in length and are extensively zoned. Ilmenite occurs as irregular plates about 1 mm in size.

Mineralogy

Pyroxene: The composition of pyroxene in 12007 is given in Baldridge et al. (1979)(figure 3).

Plagioclase: Baldridge et al. (1979) report plagioclase composition ranging An_{92-80} , with the average An_{84} .

Silica: Both tridymite (large laths) and cristobalite (interstitial) are present.

Mineralogical Mode for 12007

	Neal et al. 1994	Baldridge et al. 1979
Olivine	0	
Pyroxene	48.2	48.2
Plagioclase	39.8	39.8
Ilmenite	2.9	4
Chromite +Usp	0.6	0.2
mesostasis	0.4	0.1
"silica"	7.3	7.3

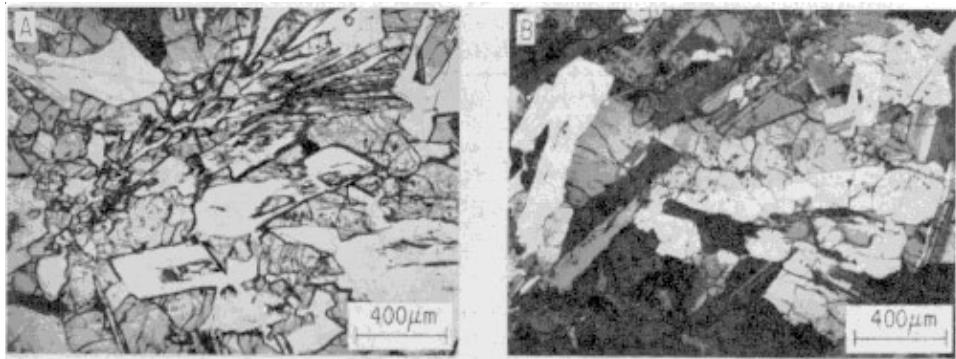


Figure 2: Photomicrographs of thin sections of 12007 (from Baldridge et al. 1979).

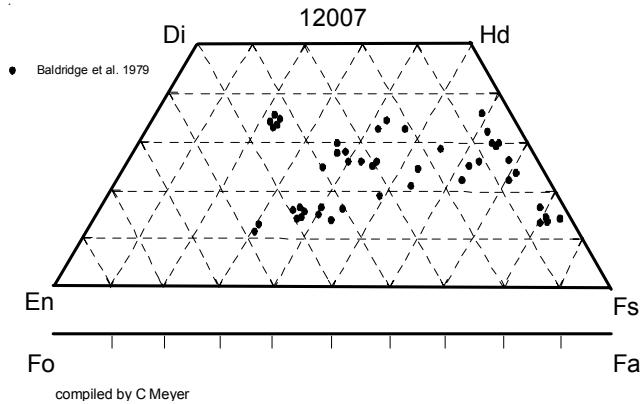


Figure 3: Pyroxene composition for 12007 (adapted from Baldridge et al. 1979).

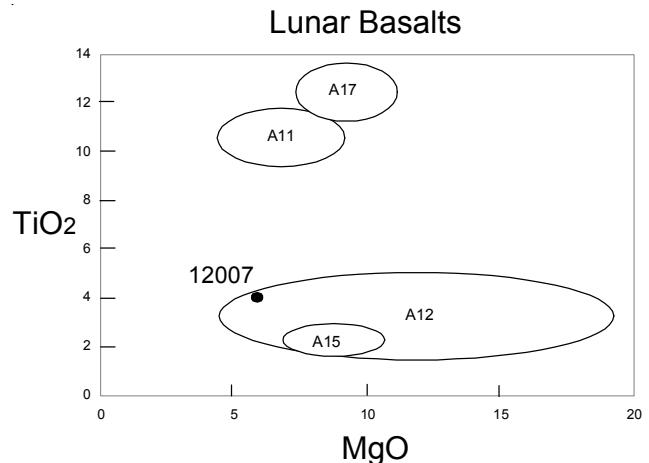


Figure 4: Composition of 12007 compared with that of other lunar basalts.

Fayalite: Fayalite occurs as intergrowths with cristobalite or high-K glass. The intergrowth with cristobalite may be due to breakdown of pyroxferroite (Baldridge et al. 1979).

Tranquillityite: Tranquillityite forms fine-grained, acicular aggregates < 1 micron in size.

Chemistry

Rhodes et al. (1977) determined the chemical composition (figures 4 and 5).

Radiogenic age dating

Not dated.

List of Photo #'s for 12007

S69-61788 – 61810	B & W mug
S69-63134 – 63157	color mug
S70-37331 – 37336	B & W
S76-25877 – 25878	color pic.

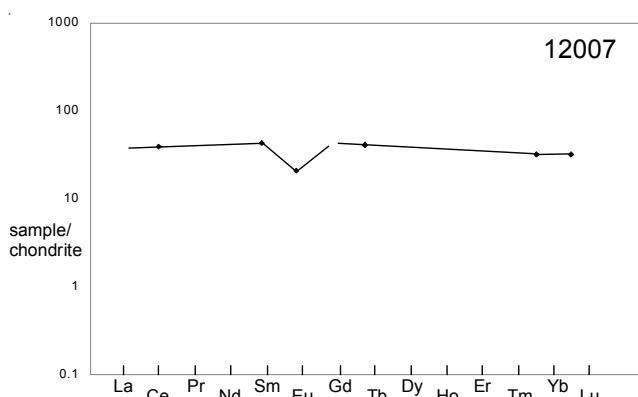


Figure 5: Normalized rare-earth-element diagram for 12007 (data from Rhodes et al. 1977).

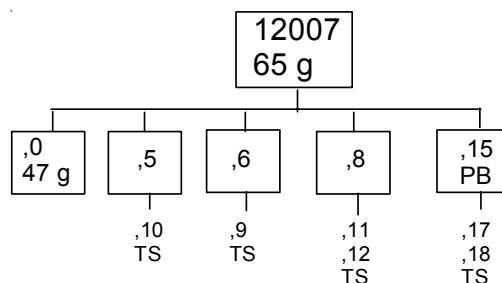


Table 1. Chemical composition of 12007.

reference Rhodes77 Baldridge79

weight

SiO ₂ %	46.42	(c)	48.03	(d)
TiO ₂	3.9	(c)	3.82	(d)
Al ₂ O ₃	11.28	(c)	12.13	(d)
FeO	19.05	(c)	17.85	(d)
MnO	0.28	(c)	0.22	(d)
MgO	5.86	(c)	5.67	(d)
CaO	11.52	(c)	12.07	(d)
Na ₂ O	0.32	(a)	0.4	(d)
K ₂ O	0.08	(c)	0.04	(d)
P ₂ O ₅	0.1	(c)	0.08	(d)
S %	0.1	(c)	0.12	(d)

sum

Sc ppm 52.3 (a)

V

Cr 1980 (a)

Co 26 (a)

Ni

Cu

Zn

Ga

Ge ppb

As

Se

Rb

Sr 142 (c)

Y 51 (c)

Zr 156 (c)

Nb 10 (c)

Mo

Ru

Rh

Pd ppb

Ag ppb

Cd ppb

In ppb

Sn ppb

Sb ppb

Te ppb

Cs ppm

Ba 91 (b)

La

Ce 23.6 (a)

Pr

Nd

Sm 6.4 (a)

Eu 1.2 (a)

Gd

Tb 1.48 (a)

Dy

Ho

Er

Tm

Yb 5.3 (a)

Lu 0.77 (a)

Hf 6.4 (a)

Ta

W ppb

Re ppb

Os ppb

Ir ppb

Pt ppb

Au ppb

Th ppm

U ppm

technique (a) INAA, (b) IDMS, (c) XRF